



Reduce Rational Expressions Worksheet

Problem Set

Simplify the following rational expressions:

1. $\frac{x^2 + 3x + 2}{x^2 - 4}$

2. $\frac{x^2 - 5x + 6}{x^2 - 9}$

3. $\frac{x^2 + 2x + 1}{x^2 - 16}$

4. $\frac{x^2 + 6x + 8}{x^2 - 25}$

5. $\frac{x^2 - 4x + 4}{x^2 - 36}$

6. $\frac{x^2 + 5x + 6}{x^2 - 49}$

7. $\frac{x^2 - 3x + 2}{x^2 - 81}$

8. $\frac{x^2 + 4x + 3}{x^2 - 100}$

9. $\frac{x^2 + 7x + 10}{x^2 - 121}$

10. $\frac{x^2 - 2x + 1}{x^2 - 144}$

Detailed Solutions

Problem 1: $\frac{x^2+3x+2}{x^2-4}$

Solution:

$$\begin{aligned}\text{Given: } & \frac{x^2 + 3x + 2}{x^2 - 4} \\ \text{Factor: } & \frac{(x+2)(x+1)}{(x-2)(x+2)} \\ \text{Cancel common factors: } & \frac{\cancel{(x+2)}(x+1)}{(x-2)\cancel{(x+2)}} \\ \text{Simplify: } & \frac{x+1}{x-2}\end{aligned}$$

Problem 2: $\frac{x^2-5x+6}{x^2-9}$

Solution:

$$\begin{aligned}\text{Given: } & \frac{x^2 - 5x + 6}{x^2 - 9} \\ \text{Factor: } & \frac{(x-3)(x-2)}{(x-3)(x+3)} \\ \text{Cancel common factors: } & \frac{\cancel{(x-3)}(x-2)}{\cancel{(x-3)}(x+3)} \\ \text{Simplify: } & \frac{x-2}{x+3}\end{aligned}$$

Problem 3: $\frac{x^2+2x+1}{x^2-16}$

Solution:

$$\begin{aligned}\text{Given: } & \frac{x^2 + 2x + 1}{x^2 - 16} \\ \text{Factor: } & \frac{(x+1)^2}{(x-4)(x+4)} \\ \text{No common factors to cancel.} & \\ \text{Simplify: } & \frac{(x+1)^2}{(x-4)(x+4)}\end{aligned}$$

Problem 4: $\frac{x^2+6x+8}{x^2-25}$

Solution:

$$\begin{aligned}\text{Given: } & \frac{x^2 + 6x + 8}{x^2 - 25} \\ \text{Factor: } & \frac{(x+4)(x+2)}{(x-5)(x+5)} \\ \text{No common factors to cancel.} & \\ \text{Simplify: } & \frac{(x+4)(x+2)}{(x-5)(x+5)}\end{aligned}$$

Problem 5: $\frac{x^2-4x+4}{x^2-36}$

Solution:

$$\text{Given: } \frac{x^2 - 4x + 4}{x^2 - 36}$$

$$\text{Factor: } \frac{(x - 2)^2}{(x - 6)(x + 6)}$$

No common factors to cancel.

$$\text{Simplify: } \frac{(x - 2)^2}{(x - 6)(x + 6)}$$

Problem 6: $\frac{x^2+5x+6}{x^2-49}$

Solution:

$$\text{Given: } \frac{x^2 + 5x + 6}{x^2 - 49}$$

$$\text{Factor: } \frac{(x + 3)(x + 2)}{(x - 7)(x + 7)}$$

No common factors to cancel.

$$\text{Simplify: } \frac{(x + 3)(x + 2)}{(x - 7)(x + 7)}$$

Problem 7: $\frac{x^2-3x+2}{x^2-81}$

Solution:

$$\text{Given: } \frac{x^2 - 3x + 2}{x^2 - 81}$$

$$\text{Factor: } \frac{(x - 2)(x - 1)}{(x - 9)(x + 9)}$$

No common factors to cancel.

$$\text{Simplify: } \frac{(x - 2)(x - 1)}{(x - 9)(x + 9)}$$

Problem 8: $\frac{x^2+4x+3}{x^2-100}$

Solution:

$$\text{Given: } \frac{x^2 + 4x + 3}{x^2 - 100}$$

$$\text{Factor: } \frac{(x + 3)(x + 1)}{(x - 10)(x + 10)}$$

No common factors to cancel.

$$\text{Simplify: } \frac{(x + 3)(x + 1)}{(x - 10)(x + 10)}$$

Problem 9: $\frac{x^2+7x+10}{x^2-121}$

Solution:

$$\text{Given: } \frac{x^2 + 7x + 10}{x^2 - 121}$$

$$\text{Factor: } \frac{(x + 5)(x + 2)}{(x - 11)(x + 11)}$$

No common factors to cancel.

$$\text{Simplify: } \frac{(x + 5)(x + 2)}{(x - 11)(x + 11)}$$

Problem 10: $\frac{x^2-2x+1}{x^2-144}$

Solution:

$$\text{Given: } \frac{x^2 - 2x + 1}{x^2 - 144}$$

$$\text{Factor: } \frac{(x - 1)^2}{(x - 12)(x + 12)}$$

No common factors to cancel.

$$\text{Simplify: } \frac{(x - 1)^2}{(x - 12)(x + 12)}$$